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ABSTRACT

This document is the teacher's edition of a learning module designed to help nonnative English speakers develop basic workplace mathematics skills. This module was developed by educators from the Emily Griffith Opportunity School. The math curriculum presented in how math might be taught to nonnative English speakers at a manufacturing worksite. Included in the manual are an introduction outlining the module's objectives and scope, eight session outlines, an appendix explaining basic differences between the mathematical conventions used in the United States and in other countries, and an answer key. The following topics are covered in the session outlines: basic math problems, basic operations, story problems, estimation and averages, decimals, standard allowed minute, division of decimals, and piece rate formulas. Each session outline contains some or all of the following: objective, lesson plan listing all of the session's learning activities and procedures for presenting them, and student handouts (learning activities). (MN)

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ED 378 429

BASIC WORKPLACE MATH FOR NON-NATIVE ENGLISH SPEAKERS

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May 9, 1994

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BASIC WORKPLACE MATH FOR NON-NATIVE ENGLISH SPEAKERS

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Pam Ingram

May 9, 1994

INTRODUCTION TO THE WORKPLACE LITERACY PROJECT

This module was developed by educators from Emily Griffith Opportunity School as part of a National Workplace Education grant funded by the U.S. Department of Education. A cooperative effort between the business and education communities, the program was designed specifically to enhance employees' literacy skills.

Direct benefits to the workforce include improved morale and motivation, self-esteem, team work, and promotional opportunities.

We gratefully acknowledge the assistance of our partners. In addition we recognize all of the students who participated in classes and who provided us with invaluable feedback for strengthening future classes.

We hope partnerships such as these will provide the catalyst for developing new or continued on-site educational opportunities.

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INTRODUCTION

This math curriculum is job-specific and is intended to be an example of how one might teach math to non-native English speakers at a manufacturing worksite.

The lessons were designed for an eight-week cycle. Classes met weekly for two hours. The class was multi-level and multi-ethnic but all of the employees worked in one area of the company - the sewing floor. The company provided class materials including a white board, flipchart, paper, and calculators.

Before I began teaching the class, I asked for input from supervisors. The company wanted their employees to be able to use and understand *dozens* in computation. Because many employees were confused about how to figure pay on a piece-rate basis, they also wanted the class to work on the piece-rate formula. By the end of the class, supervisors were reporting less confusion about paychecks and more employees successfully figuring out pay on a daily basis using the piece-rate formula.

I also met with students before the class began to assess their skills and determine their goals. They wanted to learn math vocabulary. Most of them had studied math in school in their native countries but had forgotten multiplication, division, and decimals so they also wanted to brush-up on these skills. For the most part, their math level seemed quite a bit higher than their English level. Because the students had more confidence in math, the class offered a good opportunity to practice English skills within a more comfortable context.

As far as I know, there are no math materials currently in existence which are written for low-level ESL students. However, there are a number of valuable resources, most notably:

Family Math, Jean Kerr Stenmark, Virginia Thompson, and Ruth Cossey. Lawrence Hall of Science. 1986.

Key To Fractions, Decimals and Percents, Steven Rasmussen, David Rasmussen, and Spreck Rosekrans. Key Curriculum Press. 1985.

Number Sense Series. Contemporary Books. 1990.

Essential Mathematics For Life Series. Scott Foresman and Company. 1989, 1985, 1981.

If you are new to teaching math, I would also recommend *Curriculum and Evaluation Standards for School Mathematics* which is a useful guide to teaching K-12 math. If you are new to ESL, I have included some of the different ways numbers and math problems are represented in other countries in Appendix I.

One important thing to remember with ESL math students is that we cannot assume the students know any of the language that goes with math. Because of this, I tried to include oral and written language practice with every activity.

As with any math class, I also tried to make it meaningful and relevant to the students' lives. Although I was constantly striving to stay away from simple paper to pencil computation, I found that type of practice was often received enthusiastically. At the end of one Friday class, I handed out computation practice sheets on decimal multiplication and division. Although I felt guilty that it was not an interactive, "meaningful" lesson, the students worked intensely until I had to tell them it was time to go

home. Paper to pencil computation practice often seemed a welcome break from the daunting task of learning a language.

Traditionally ESL students have not been taught math until they have reached a certain level of proficiency in English. However, I see a lot of value in combining English and math from the very beginning. Students gain confidence and have the opportunity to practice their language in a different context. Not only do ESL students often request math, more and more businesses are recognizing the need as well.

Each lesson that follows may seem like more than enough for a two-hour class. Feel free to pick and choose whatever seems useful. The hope is that if you are an ESL teacher, this will give you some ideas about how to incorporate math into your classes. If you are a math teacher, this may give you some ideas about how to work with low-level ESL students. And if you teach math to non-native English speakers at a manufacturing worksite it will be a useful guide.

SESSION 1

OBJECTIVE: INTRODUCE AND PRACTICE BASIC MATH VOCABULARY

ACTIVITY	EXPLANATION
INTRODUCTIONS: INTERVIEWS (first class only)	After initial introductions, break the students into pairs and have them ask each other the questions from HANDOUT 1-1. Have the class come back together and share information. These questions give you a chance to get to know students and see how they can use numbers. (Can they read one digit and two digit numbers? Do they know how to read addresses? etc.)
WARM-UP: Ask WHAT IS MATH? HOW DO YOU USE MATH IN EVERYDAY LIFE?	This serves three purposes. If it is your first meeting with these students, it gives you a chance to assess their verbal communication skills and aural comprehension. Students' answers will show if they are aware of using math in their lives at work and at home. And it shows you how and if the students can use the necessary vocabulary to explain how they use math.

SESSION 1

ACTIVITY	EXPLANATION
ACTIVITY #1: INTRODUCTION TO VOCABULARY	
* Write 2 + 2 = 4 on the board. * Ask, " How do you read that? "	This introduces plus and equals. It will also serve as a reinforcement of number vocabulary.
* Ask, " How do you do the problem? " Cue: "I _____."	This introduces add.
* Ask, "What do you call the answer? "	This introduces sum.
* Ask, "What is this (subject) called? "	This introduces addition.
Go through the same procedure with each operation. With a multi-level class it is likely that some students will only be able to use plus while others will be able to use all the new vocabulary. Tell the students not to copy information off the board. You will be giving them a handout.	

ACTIVITY	EXPLANATION
ACTIVITY #2: VOCABULARY PRACTICE HANDOUT	HANDOUT 1-2 contains the information presented on the board. Practice reading the problems as a class. Discuss the various ways to set up a problem. Ask the students if they do it differently in their countries. For example, division problems are often set up like this 15 ⟌ 5 in other countries (see Appendix I). Have the students complete the question at the bottom of each square on the handout. Tell them to keep this as a resource to refer to during subsequent classes.
ACTIVITY #3: PRACTICE	Hand out calculators to each student. Ask them to point out the addition , subtraction, multiplication, division and equals key. Show them how to clear. Dictate problems e.g. "34 + 72" and ask them to find the answer. Have one student play the role of teacher and dictate problems to the rest of the class.

ACTIVITY	EXPLANATION
ACTIVITY #4: WORD SEARCH	Ask the students to look at HANDOUT 1-3. Tell them that the goal of this activity is to find math-related words. Words can be found horizontally and vertically (you made need to introduce horizontal and vertical as new vocabulary first). As the students locate words, have them write the word in the appropriate column. Go over the example before you begin.

HANDOUT 1-1:
INTERVIEWS - ASK YOUR CLASSMATE

1. What's your name?

   _____

2. Where are you from? _____

3. How old are you? _____

4. How many children do you have? _____

5. How long have you been in the U.S.? _____

6. What's your address? _____

   _____

7. How many people work at ABC Company? _____

8. If you won the lottery, how much money would you win?

   _____

   What would you do with the money? _____

   _____

HANDOUT 1-2: BASIC MATH VOCABULARY

ADDITION

$$\begin{array}{r} 2 \\ +\,3 \\ \hline 5 \end{array} \qquad 2 + 3 = 5$$

2 plus 3 equals 5.

What is the sum of 2 and 3?

How do you find the answer?

I _____

_____

SUBTRACTION

$$\begin{array}{r} 5 \\ -\,3 \\ \hline 2 \end{array} \qquad 5 - 3 = 2$$

5 minus 3 equals 2.

5 take away 3 equals 2

What is the difference?

How do you find the answer?

I _____

_____

MULITPLICATION

$$\begin{array}{r} 2 \\ \times\,3 \\ \hline 6 \end{array} \qquad 2 \times 3 = 6 \qquad 2\,(3) = 6$$

2 times 3 equals 6.

What is the product of 2 and 6?

How do you find the answer?

I _____

_____

DIVISION

$$3\overline{)\,6}\,2 \qquad 6 \quad 3 = 2 \qquad \frac{6}{3} = 2$$

6 divided by 3 equals 2.

What is the quotient?

How do you find the answer?

I _____

_____

HANDOUT 1-3:
WORD SEARCH

A	D	I	F	F	E	R	E	N	C	E	B	P	R	O	D	U	C	T
C	D	D	Z	Y	D	I	V	I	D	E	F	I	G	E	H	O	I	U
D	J	I	A	M	K	E	L	I	M	O	Q	U	O	T	I	E	N	T
I	N	V	U	U	P	O	U	R	S	A	T	E	V	O	W	U	X	A
V	Y	I	Z	L	A	D	E	T	A	K	E	A	W	A	Y	C	E	D
I	E	S	F	T	G	H	A	J	E	K	O	L	U	M	I	N	S	O
D	P	I	Q	I	R	S	A	D	D	I	T	I	O	N	T	V	U	W
E	X	O	Y	P	Z	A	M	B	C	I	D	E	F	A	G	O	B	U
D	A	N	B	L	C	D	U	E	S	F	G	H	I	J	E	K	T	A
B	L	M	N	I	O	P	L	Q	U	R	M	I	N	U	S	S	R	T
Y	U	V	W	C	X	Y	T	Z	B	A	B	E	C	O	D	E	A	F
G	H	I	J	A	K	L	I	M	T	N	P	O	T	P	Q	R	C	S
A	D	D	T	T	U	V	P	W	R	X	L	Y	I	Z	A	B	T	C
C	S	B	E	I	F	I	L	V	A	W	U	P	M	O	N	E	I	D
D	U	G	J	O	K	L	Y	X	C	U	S	Q	E	M	L	F	O	G
H	M	N	O	N	M	A	Z	Y	T	T	S	R	S	K	J	I	N	H

+	-	X	÷
	difference		

SESSION 2

OBJECTIVE: REVIEW BASIC OPERATIONS

ACTIVITY	EXPLANATION
WARM-UP: HOW MUCH IS YOUR NAME WORTH?	HANDOUT 2-1 serves two purposes. It offers practice with addition and subtraction and it gives the class a chance to learn each other's names.
ACTIVITY #1: REVIEW THE TIMES TABLE	Ask the students to practice counting by intervals, i.e.," 2-4-6-8-10-12-14-16-18-20". For more of a challenge, ask them to do it backwards! The recommended order (easiest to most difficult) is 2's, 5's, 10's, 3's, 4's, 6's, 8's, 11's, 9's and 7's.
A more challenging idea: Play the game BUZZ. Students number off. As they say their number, they must pay attention to the number 7 or any of its multiples. When they get to 7, they substitute the word BUZZ instead. When they get to 14 (a multiple of 7), they say BUZZ again. For example, 1-2-3-4-5-6-BUZZ-8-9-10-11-12-13-BUZZ etc.	

SESSION 2

ACTIVITY	EXPLANATION
ACTIVITY #2: TIMES TABLE	Ask the students to complete the times table (HANDOUT 2-2). Encourage them to work in pairs and help each other. Once students have completed the table, tell them to keep the handout as a resource.
ACTIVITY #3: PRACTICE HANDOUT	As students complete HANDOUT 2-3, watch to see which students need to refer to the times table. This gives you an idea of how much more time you might need to spend on multiplication facts or who will need extra homework.
ACTIVITY #4: MORE MULTIPLICATION AND DIVISION	Write some longer problems on the board e.g., $\begin{array}{r} 27 \\ \times\ 15 \\ \hline \end{array}$, $5\overline{)125}$ Have a student volunteer to come up to the board and show how to find the answers to these problems. This gives the student a chance to use English to explain the procedure. The rest of the class is usually more than willing to jump in and help. As new math words come up, keep a running vocabulary list on flipchart paper. Post the list in an easy-to-see place in the classroom. Have computation practice sheets available for homework.

SESSION 2

ACTIVITY	EXPLANATION
ACTIVITY #5: STORY PROBLEMS	Using the language experience approach, the class dictates a math story problem which you write on the board. You may have to get them started with a cue, e.g.," Bui and Tan went to the store.... ." Students then break into 4 groups (or more depending on the size of your class) and each group picks a slip of paper with an operation on it. Distribute flipchart-sized paper and markers. Ask each group to write a story problem of its own. Each group member should contribute, but you might want to ask one person in each group to be the "scribe." You will use the story problems in the next class.

HANDOUT 2-1
HOW MUCH IS YOUR NAME WORTH?

A = $1	N = $14
B = $2	O = $15
C = $3	P = $16
D = $4	Q = $17
E = $5	R = $18
F = $6	S = $19
G = $7	T = $20
H = $8	U = $21
I = $9	V = $22
J = $10	W = $23
K = $11	X = $24
L = $12	Y = $25
M = $13	Z = $26

1. How much is your name worth?

2. What's the difference between your first and last name?

3. Find a word worth $50.

4. What's the most expensive word you can find?

Taken from Family Math

HANDOUT 2-2
TIMES TABLE

X	1	2	3	4	5	6	7	8	9	10	11	12
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												

HANDOUT 2-3
MULTIPLICATION & DIVISION REVIEW

1. 7 x 3 = _____

   3 x 7 = _____

   21 ÷ 3 = _____

   21 ÷ 7 = _____

2. 6 x 5 = _____

   5 x 6 = _____

   30 ÷ 5 = _____

   30 ÷ 6 = _____

3. 6, 4, 24

   6 x 4 = 24

   4 x 6 = 24

   24 ÷ 4 = 6

   24 ÷ 6 = 4

4. 6, 48, 8

   _____

   _____

   _____

   _____

5. 32, 8, 4

   _____

   _____

   _____

   _____

6. 3 x 6 = _____

7. 1 x 7 = _____

8. 16 ÷ 4 = _____

9. 27 ÷ 9 = _____

10. 18 ÷ 2 = _____

HANDOUT 2-3
MULTIPLICATION & DIVISION REVIEW
(cont'd)

11. 8 x 7 = _____

12. 2 x 10 = _____

13. ____ x 4 = 20

14. 49 ÷ ____ = 7

15. 5 x ____ = 45

16. 8 x ____ = 64

17. 54 ÷ ____ = 9

18. ____ ÷ 9 = 9

SESSION 3

OBJECTIVE: PRACTICE STORY PROBLEMS WITH EMPHASIS ON DOZENS

ACTIVITY	EXPLANATION
WARM-UP: STUDENT WRITTEN STORY PROBLEMS	HANDOUT 3-1 contains edited student stories. It offers practice choosing the correct operation. After students have completed the handout, ask them to come together as a class and discuss which operation they used for each problem and why.
ACTIVITY #1: COMPANY MEMO (NOTE: This memo was chosen because the ABC company wanted their employees to understand and use "dozens" in math computation. The memo also served as a way for me to learn more about their jobs.)	Read the memo as a class. If the entire memo seems too over-whelming, start with the words in big print or fold it in half and do the top half first. List new words on flipchart paper. Keep a list on the wall to be reviewed in following classes. After the class has read the memo in its entirety, focus only on the top half of the memo. Discuss vocabulary, specifically, dozens.

SESSION 3

ACTIVITY	EXPLANATION
ACTIVITY #2: QUESTIONS ABOUT MEMO	Have students complete HANDOUT 3-3 alone or in pairs. Come back together and discuss answers. This also serves as a vocabulary review.
ACTIVITY #3: WORD PROBLEMS	HANDOUT 3-4 offers practice in setting up problems and understanding what the numbers represent. It is also good practice in forming questions. After students have completed the handout, come together as a class and correct the questions on the board. This is a good opportunity to focus on problem areas such as the use of *do* and *did* in questions.

HANDOUT 3-1: DO YOU ADD, SUBTRACT, MULTIPLY OR DIVIDE?

1. Vera will go shopping tomorrow. She will buy five gallons of orange juice. One gallon costs $2.65.

   How much will she pay? _____

   How? _____

2. Sim, Kiu, and Hong went to a restaurant. They ate dinner. The total was $75.00. They paid $100.00.

   How much was their change? _____

   How? _____

3. Last night, Tom, Bob, and John came to the restaurant. Their dinner was $33.00. Later, they went to the cinema. 3 tickets were $18.00 and some pop was $6.00.

   How much did each person pay? _____

   How? _____

   _____

4. Sam, Yee Wan, and Huyen went to a Chinese restaurant. Sam ate egg rolls for $3.00. Yee Wan ate shrimp for $4.50. Huyen ate crab soup for $2.50.

   How much did they pay altogether? _____

   How? _____

HANDOUT 3-2:
SAMPLE MEMO

HATS OFF TO YOU!!!!!!

Congratulations ABC Company Employees

A new record has once again been set by ABC Company employees. The average number of dozens produced and sent through end of line last month was 1107!! That is 100 dozen more than we regularly produce!

C O N G R A T U L A T I O N S

Everyone plays a part in the success of the company and it shows! From the salesmen to our customer support staff, from cutters and pullers to direct embroidery operations. From the sewing floor to packing and shipping and all administrative employees in between. Take a minute, shake your co-worker's hand, pat yourself on the back for a job well done.

THANKS and keep up the good work. Your individual efforts and working together pays off.

HANDOUT 3-3:
MEMO QUESTIONS

1. How many caps make a dozen?

2. What else do you talk about by the dozen?

3. How many dozens did ABC Company produce last month.

4. Was that better than usual?

5. How many dozens does ABC Company usually produce?

6. Last month, ABC Company made 1107 dozen caps. How many caps were made?

7. How did you get the answer?

8. If ABC Company made 12,084 caps in one month, how many dozens were produced?

9. How did you get the answer?

HANDOUT 3-3:
WRITE THE QUESTION

1. Nina worked 8 hours.
   Hong worked 10 hours.

   Question: How many hours did they work altogether?

   Problem: _____ + _____ = _____

2. Sim sewed 150 _____
   Manhmey sewed 200 _____

   Question: _____
   _____

   Problem: _____ _____ _____ = _____

3. ABC Company baseball caps cost _____
   ABC Company visors cost _____

   Question: _____
   _____

   Problem: _____ _____ _____ = _____

HANDOUT 3-3:
WRITE THE QUESTION
(cont'd)

4. Every day this week, John cut 456 d _ _ _ _ caps.

   Question: _____
   _____

   Problem: _____ _____ _____ = _____

5. Kathy earned _____
   She spent _____

   Question: _____
   _____

   Problem: _____ _____ _____ = _____

6. Kevin's regular pay is _____
   His overtime pay is _____

   Question: _____
   _____

   Problem: _____ _____ _____ = _____

OBJECTIVE 1: PRACTICE ESTIMATION

ACTIVITY	EXPLANATION
WARM-UP: WHICH ANSWER IS BIGGER?	Before you give the students HANDOUT 4-1, talk about estimation. Ask questions which require estimation to answer them. For example, "What is the temperature today? "etc. Students should then complete the handout without using a calculator or figuring on paper. Assure them they can check the answers once they are done.
ACTIVITY #1: ESTIMATION	Have the students complete HANDOUT 4-2 in class. Give them time to work independently, then come together as a group to make sure everybody has the right idea. For homework ask them to check their answers at home and at work.

ACTIVITY	EXPLANATION
ACTIVITY #1: ESTIMATION (cont'd)	NOTE: It is a good idea to reinforce estimation skills in all the lessons. Students need to have a sense of what the numbers they are working with represent and whether or not their answers make sense. *Family Math* (see introduction) offers excellent calculator games which are a fun way to practice estimation, mental computation and number sense.

OBJECTIVE 2: INTRODUCE AND PRACTICE AVERAGES

ACTIVITY	EXPLANATION
ACTIVITY #2: QUESTION GRID	Practice the questions necessary to fill in the grid (HANDOUT 4-3.) Try to get the students to form the questions orally before you write them down. You are looking for something close to "How old are you?", "How many years have you worked at ABC?", "How many brothers and sisters do you have?" and "How long does it take you to get to work?" Have students ask each other questions to fill in the grid for everybody in the class. Encourage them to stand up and move around. Assemble the group and ask them to help you fill in the grid. Ask," How long has Manhmey worked at the company?", for example. Other language areas to practice might include comparisons. From the information on the grid, you could have students practice

ACTIVITY	EXPLANATION
ACTIVITY #2: QUESTION GRID (cont'd)	questions like " Who is the oldest?" or "Who has worked at the company the longest?" You could also have students write sentences such as "Manhmey has worked here longer than Yee Won."
Introduce AVERAGE.	Ask students to refer to HANDOUT 3-2 (MEMO) and discuss the meaning of average in this context. Use the information from the grid to demonstrate figuring the average age in the class as an example.
ACTIVITY #3: AVERAGE PRACTICE HANDOUT	HANDOUT 4-4 offers more practice with the information in the grid

HANDOUT 4-1:
ESTIMATE - WHICH IS BIGGER?

	A	B	A or B
1.	23 x 19	85 x 5	
2.	348 ÷ 4	120 - 38	
3.	36 - 28	180 ÷ 30	
4.	64 x 36	36 x 64	
5.	510 - 37	810 - 357	
6.	637 ÷ 7	25 x 4	
7.	3,075 + 938	694 x 6	
8.	54 + 45	73 + 29	
9.	702 - 46	568 + 78	
10.	8 x 9	1184 ÷ 16	

HANDOUT 4-2:
ESTIMATE THE ANSWERS

1. How many people work at the ABC Company?

2. How many chairs are in the lunch room?

3. How tall is Tracy?

4. How many windows are in your house?

5. How long is the longest table in this room?

7. How many times do you open the refrigerator in one day.

8. What time will Manhmey get to class next Friday?

HANDOUT 4-3: GRID

NAME	AGE	YEARS AT ABC COMPANY	BROTHERS AND SISTERS	TIME TO WORK

HANDOUT 4-4: AVERAGES

1. What is the average age in our class?

2. Who has been working at ABC Company for the longest time?

3. What is the average length of employment (in months.)

4. What is the average number of brothers and sisters? (together)

5. Who has the shortest commute?

6. What is the average commute?

SESSION 5

OBJECTIVE: INTRODUCE DECIMALS THROUGH DISCUSSION OF WORK TICKET AND MONEY

ACTIVITY	EXPLANATION
WARM - UP: REVIEW	First ask students about their homework (HANDOUT 4-2). Were they close? Next distribute HANDOUT 5-1. Have students complete individually or in pairs as a quick review of averages and dozens.
ACTIVITY #1: WORK TICKET	HANDOUT 5-2 is a work ticket. As a class, identify each part of the ticket. Refer to HANDOUTS 5-2T and 5-3T for the correct answers. Brainstorm each of the students' job tasks. See if they can come up with more tasks than are represented in the class. Ask, "Which operations take longer? Why?" Introduce "point" or "decimal point". Why and how are they used? Are they bigger or smaller than one? Point out ".1659" on the work ticket. Ask students to read it. What does it mean?

SESSION 5

ACTIVITY	EXPLANATION
ACTIVITY #2: MORE DECIMAL CONCEPTS	Bring in coins and bills. Brainstorm names (penny, nickel, etc.) Ask students to come up to the board and show how they write money values (twenty-five cents, two-fifty, etc.) This is usually a good time to go over commas and decimal points. In many other countries a comma is used when writing money ($1,80). Discuss what the decimal numbers represent. "How many pennies in one dollar?" etc. Introduce ten**ths** and hundred**ths**. Spend plenty of time practicing pronunciation (-**ths** is a killer!) For more follow-up activities, see the resources listed in the introduction.
ACTIVITY #3: DICTATION	Dictate different money amounts. Have students practice pronouncing and reading what they wrote.
ACTIVITY #4: ADDING AND SUBTRACTING	Have students come up and explain how to add and subtract decimals. For homework give them computation practice handouts from one of the resources listed in the introduction.

HANDOUT 5-1:
REVIEW OF AVERAGES & DOZENS

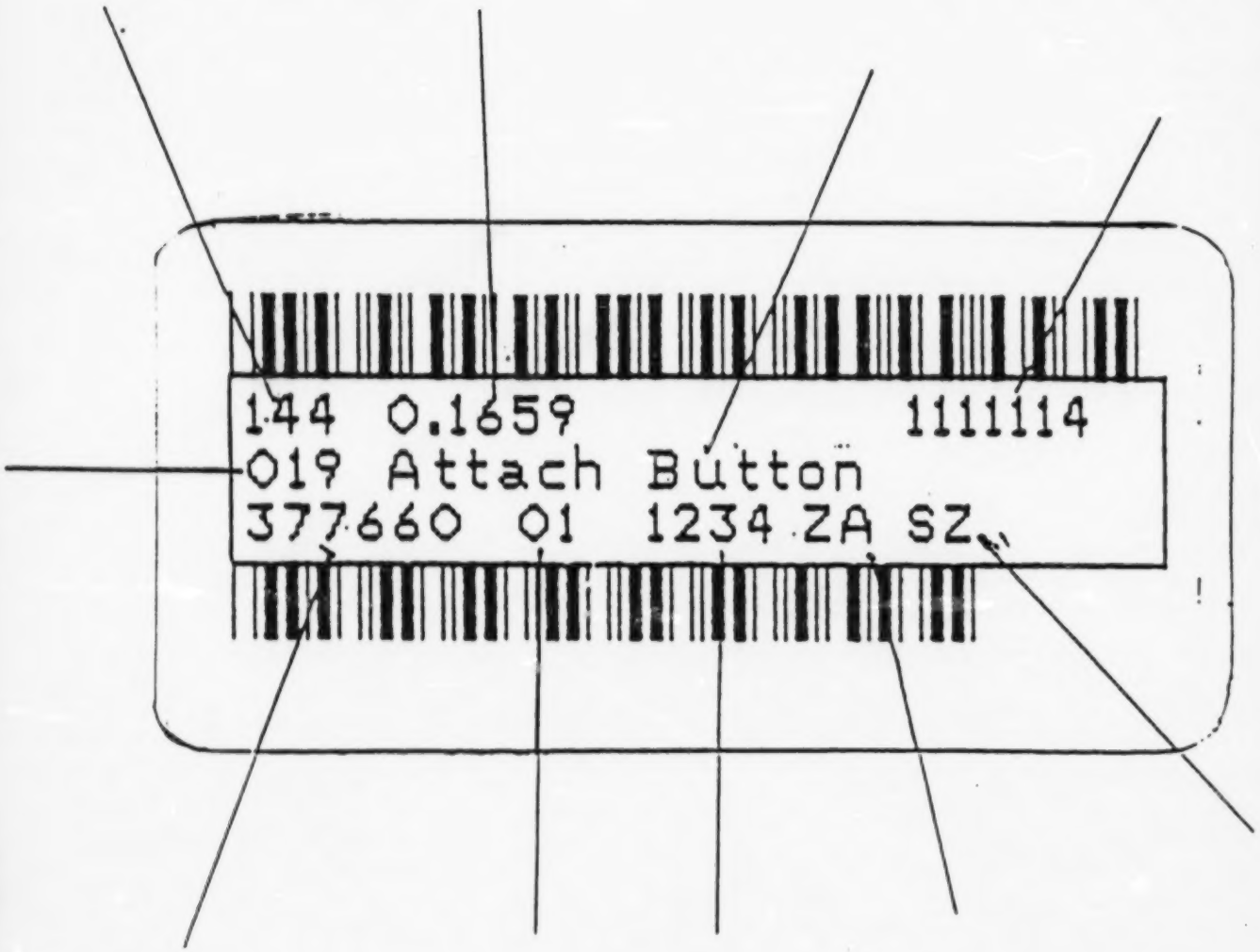
1. If ABC Company made 1107 dozen caps in June, 1017 dozen caps in July, and 1092 dozen caps in August, what was the average number of dozen made?

2. What was the total number of caps made? (not in dozens)

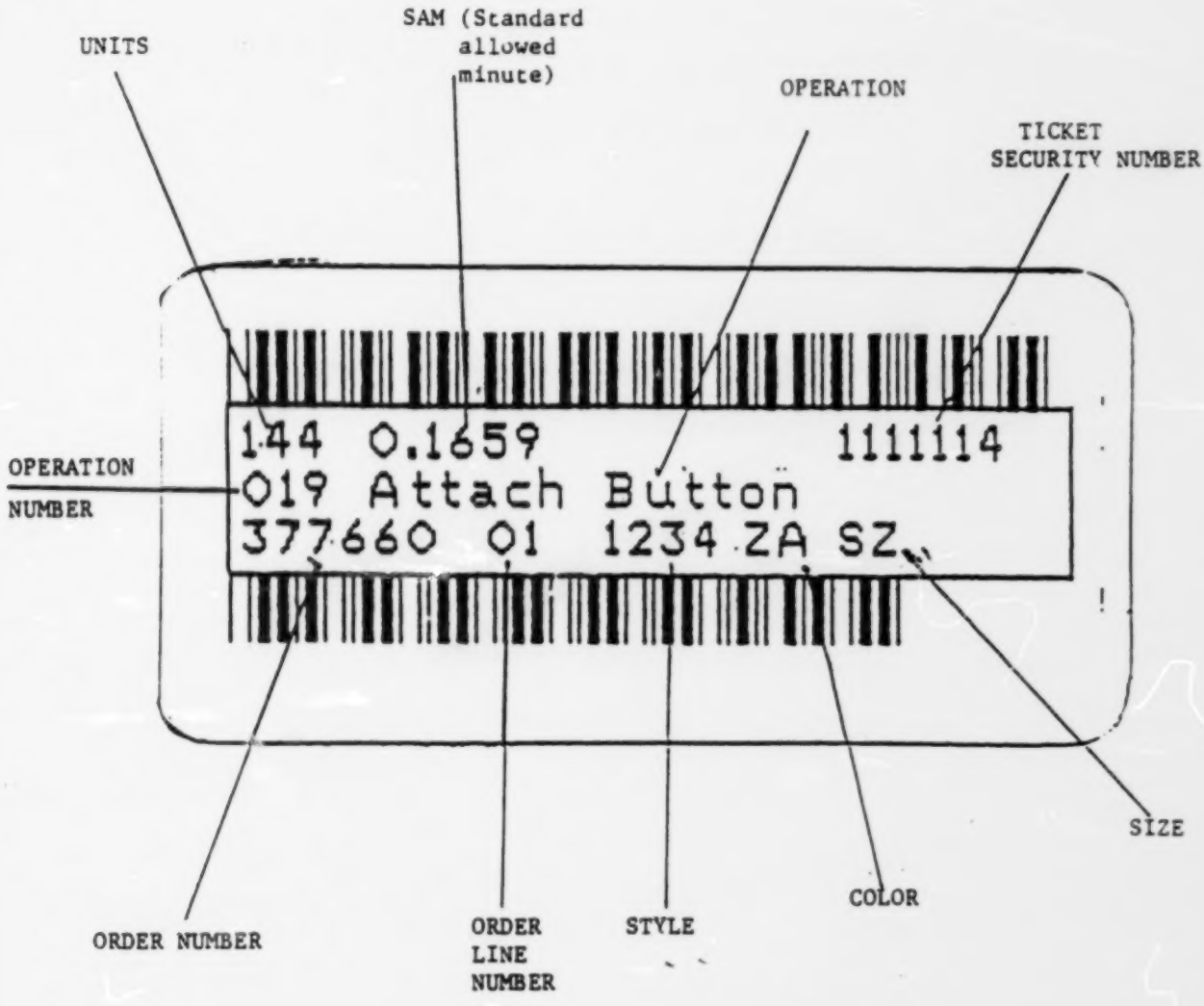
3. If Kathy worked 40 hours the first week of June, 50 hours the second week, 48 the third week, and 42 hours the last week of the month, what was her weekly average?

4. Sue looked in the paper for 2-bedroom apartments. She found 4 with rents of $500, $350, $420, and $530. What was the average rent?

HANDOUT 5-2:
WORK TICKET



HANDOUT 5-2T:
WORK TICKET, TEACHER'S ANSWER SHEET



HANDOUT 5-3T:
TEACHER'S ANSWER SHEET
EXAMPLE JOB TASKS (ACTIVITY #1)

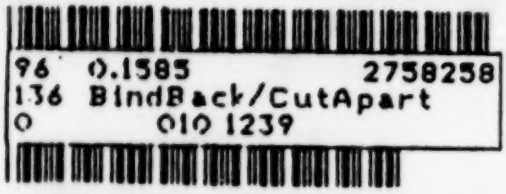
Tape seam
Sew sweat
Sew clip on
Tip to side
Size
Sluff visor
Cut sweat
Label
Trimmer
Close
Join back center
Serge front
Sew strap
Grommet
Buckle
Tape back
Bind back

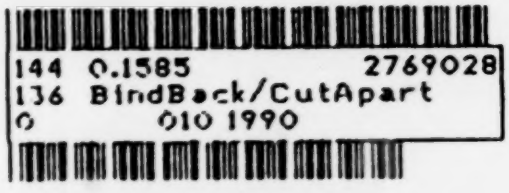
OBJECTIVE:	CONTINUE WITH DECIMALS AND INTRODUCE SAM (STANDARD ALLOWED MINUTE)

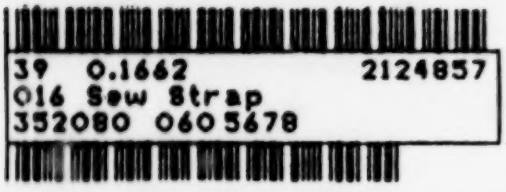
ACTIVITY	EXPLANATION
WARM-UP: WORK TICKET REVIEW	Distribute another copy of the work ticket (or hope your students have it with them!) Ask them to identify each part as a group.
ACTIVITY #1: PRACTICE WITH TENTHS, HUNDREDTHS, THOUSANDTHS AND TEN THOUSANDTHS	Briefly review tenths and hundredths. Introduce thousandths and ten thousandths. You could write examples of each decimal number on the board e.g., .5 , .05 , .005 , .0005 and practice reading these numbers as a group. Give each student an index card and ask her to write a decimal number. Collect and redistribute. Have one student come up to the board. Call on another student to dictate the number on her index card. Allow the class to help each other. When everyone has had a turn, ask each student to stand up and show the rest

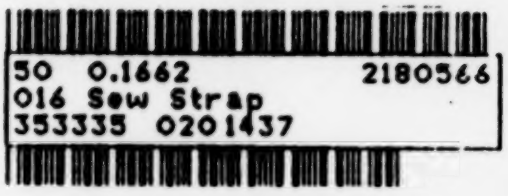
ACTIVITY	EXPLANATION
ACTIVITY #1: (CONT'D)	of the class her card. Now ask students to stand up and organize themselves in order from biggest number to smallest.
ACTIVITY #2	Using the work ticket, go back to the decimal number ".1659". Identify as the SAM (standard allowed minute). Explain that this number represents the part of a minute that it takes employees to finish one piece. Show them how to determine the length of time it takes to complete the ticket by multiplying the SAM by the number of pieces. Distribute HANDOUT 6-1 and ask students to complete. After they finish, come back together to check answers and compare the problems they wrote.

HANDOUT 6-1:
WORK TICKET QUESTIONS

1. 

2. 

3. 

4. 

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A. What is the operation on ticket number 1?

B. What is the operation on ticket number 4?

C. What is the SAM on ticket number 2?

D. What is the SAM on ticket number 4?

E. Which operation takes longer?

HANDOUT 6-1:
WORK TICKET QUESTIONS
(cont'd)

F. How long will it take to finish ticket number 1?

G. How long will it take to finish ticket number 4?

H. Which ticket (1, 2, 3, or 4) will take the longest?

I. Write your own problem.

SESSION 7

OBJECTIVE:	**INTRODUCE DIVISION OF DECIMALS AND PRACTICE WITH PIECE RATE FORMULA**

ACTIVITY	EXPLANATION
WARM-UP: "SAM" REVIEW (HANDOUT 7-1)	
ACTIVITY #1: DIVISION PRACTICE	Ask a student to come to the board and explain how to divide decimals. Give a variety of example problems e.g. $5\overline{)137}$, $.4\overline{)208}$, $.7\overline{).259}$ Design practice sheets on your own or use the suggested resources.
ACTIVITY #2: PIECE RATE	Refer to the work ticket again. Ask the students how much their hourly wage is. (In this case their hourly wage was $7.16/hour.) Ask, "If you make $7.16/hour, how much do you make a minute?" (Answer: $.1193)" Introduce the following formula for piece rate. **SAM x UNITS x .1193 = PAY**

ACTIVITY	EXPLANATION
ACTIVITY #3: DICTATION	When they complete the piece-rate calculation they will get long decimal numbers. If they are unsure how to round off to a dollar value, distribute calculators and dictate equations to them. Sample equations follow: 144 x .1659 x .1193 = 144 x .1406 x .1193 = 144 x .2402 x .1193 = 96 x .1555 x .1193 = 39 x .1662 x .1193 = 144 x .5555 x .1193 = 144 x .0974 x .1193 = For more practice, have the students work in pairs and dictate to their partners.
ACTIVITY #4: PRACTICE HANDOUT	HANDOUT 7-2 offers practice using the piece-rate formula on an example of a "gum sheet"(pg. 2 of HANDOUT 7-2) they use at work. Gum sheets are where they collect all of their work tickets for one day. Author's note: you might assume that the students already know how to figure out pay, but I discovered that at least half the class did not understand how to figure their daily pay before they learned it in class.

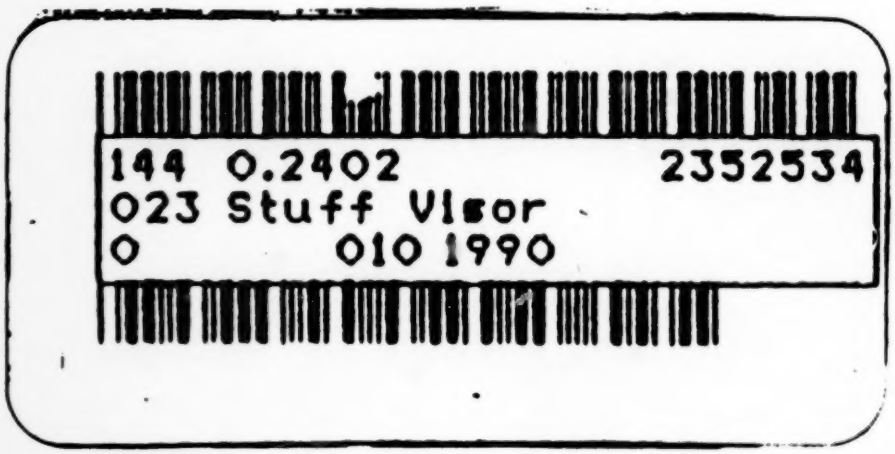
HANDOUT 7-1: REVIEW

1. What is the operation?

2. How many pieces are there on this ticket?

3. What is the SAM?

4. How long will it take to finish this ticket?



HANDOUT 7-2:
SAM x UNITS x MINUTE VALUE = PAY

1. What is the operation?

2. What is the SAM?

3. How many units are on ticket number one?

4. How long will it take you to finish ticket number two?

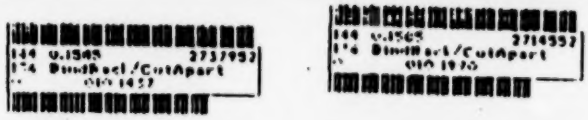
5. How much will you make for ticket number three?

6. How much will you make for the whole gum sheet?

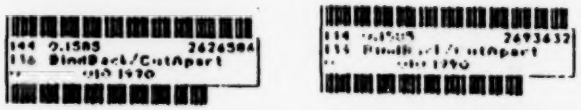
7. How long will it take to finish the gum sheet?

HANDOUT 7-3:
GUM SHEET

1.



2.



3.

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OBJECTIVE: EVALUATION/REVIEW

ACTIVITY	EXPLANATION
WARM - UP: PIECE -RATE REVIEW HANDOUT	This handout offers more advanced practice using the piece-rate formula.
EVALUATION: 2 handouts.	As a group brainstorm a list of what the students have done during this eight-week course. This gives you a good idea of what activities made an impact, or which activities they enjoyed the most. AUTHOR'S NOTE: I have done this and been met with total silence. However, with this particular group I did not even have to help get the list started; they were eager to tell me. HANDOUT 8-3 is another evaluation to be completed independently.
ACTIVITY #2: REVIEW	Encourage the students to work together to complete review sheets (HANDOUT 8-4). This review can take the place of a test. What they do not finish in class can be taken home.

HANDOUT 8-1:
MORE
SAM x UNITS x MINUTE VALUE = PAY

1. What is the operation on ticket number one?

2. What is the SAM?

3. How may units are on ticket number one?

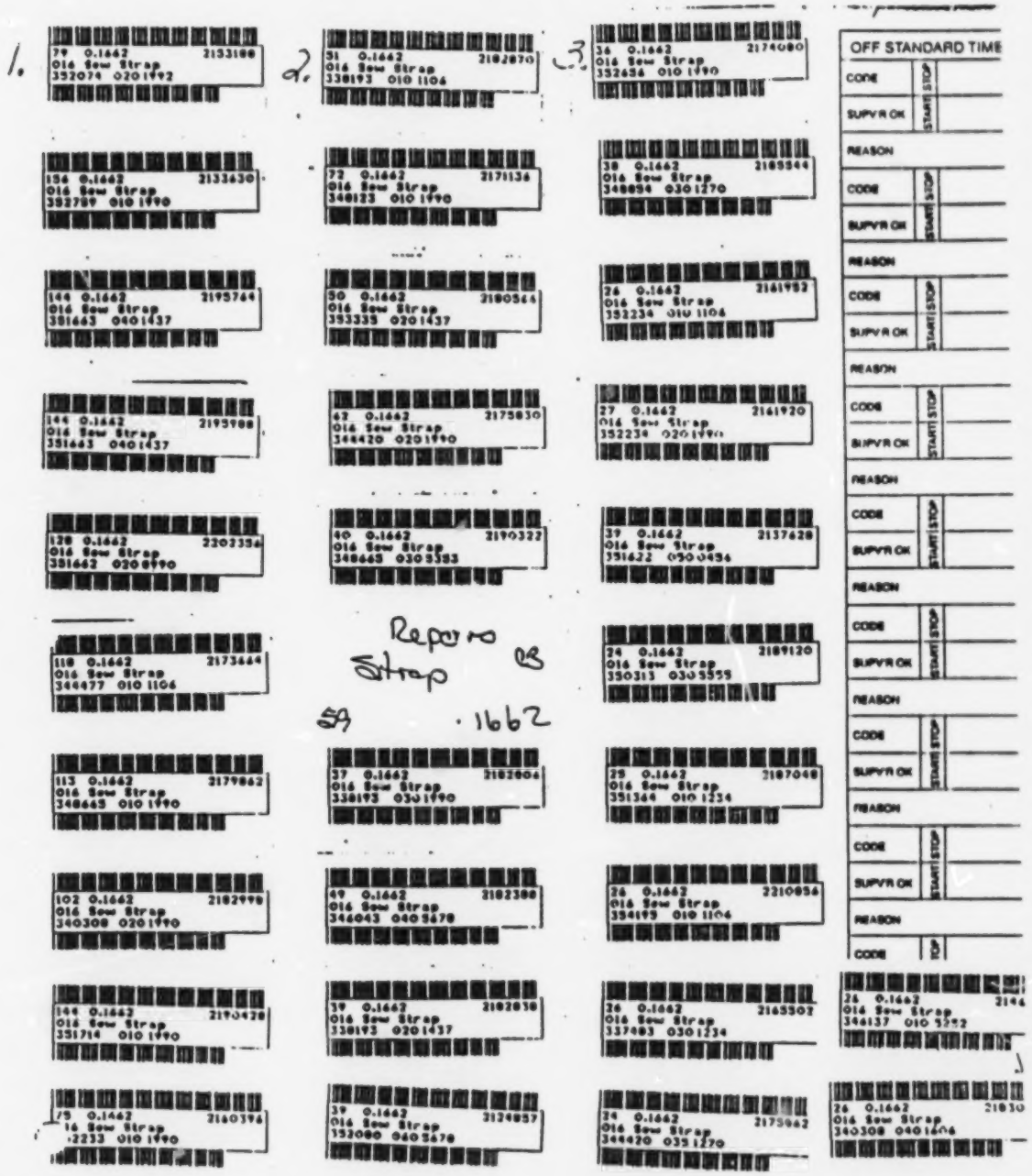
4. How long will it take you to finish ticket number one?

5. How much will you make for ticket number one?

6. How much will you make for the whole gum sheet?

7. How long will it take you to finish this gum sheet?

HANDOUT 8-1A: GUM SHEET



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HANDOUT 8-2:
THIS CLASS, WE HAVE STUDIED ...

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

HANDOUT 8-2T: THIS CLASS, WE HAVE STUDIED ..., EXAMPLE OF ANSWERS

1. Count
2. Add
3. English
4. Subtract
5. Times/multiply
6. Divide
7. Average
8. Tickets (SAMs), units
9. Decimals (point)
10. Point/comma
11. Story problems

HANDOUT 8-3: EVALUATION

Circle one Answer:

1. The class was

   too easy easy OK difficult too difficult

2. The teacher was

   easy to understand so-so difficult to understand

Answer these questions:

3. What did you like about the class?

   _____

   _____

   _____

   _____

   _____

   _____

4. What did you <u>not</u> like about the class?

   _____

   _____

   _____

   _____

   _____

HANDOUT 8-3: EVALUATION (cont'd)

5. Next class, I want to study _____
_____
_____
_____
_____

6. Comments: _____
_____
_____
_____
_____
_____

HANDOUT 8-4: VOCABULARY

Match each numbered item to a letter.

1.	Plus	A.	56 - 13
2.	SAM	B.	=
3.	Times	C.	3/4
4.	Subtract	D.	7 + 9
5.	Dozen	E.	144 .1585 .:..... .... 377660 01 119.4
6.	Operation	F.	4 2
7.	Equals	G.	12
8.	Fraction	H.	8 x 16
9.	Divide	I.	.567
10.	Decimal	J.	Stuff Visor

HANDOUT 8-4: VOCABULARY (cont'd)

Match the numbers to the words.

C	1.	two and three hundredths	a.	6.24
_____	2.	six hundred twenty-four	b.	609.8
_____	3.	nine thousand five hundred seventy-one	c.	2.03
_____	4.	three and seventeen hundredths	d.	2.003
_____	5.	six hundred nine and eight tenths	e.	9,571
_____	6.	six and twenty-four hundredths	f.	31.7
_____	7.	ninety-five and seventy-one hundredths	g.	62.4
_____	8.	two and three thousandths	h.	6.024
_____	9.	thirty-one and seven tenths	i.	23
_____	10.	sixty-two and four tenths	j.	6,098
_____	11.	six and twenty-four thousandths	k.	3.17
_____	12.	three and seventeen thousandths	l.	3.017
_____	13.	six thousand ninety-eight	m.	60.98
_____	14.	nine hundred fifty-seven and one tenth	n.	9.571
_____	15.	three hundred seventeen	o.	957.1
_____	16.	sixty and ninety-eight hundredths	p.	624
_____	17.	twenty-three	q.	2.3
_____	18.	six and ninety-eight thousandths	r.	95.71
_____	19.	nine and five hundred seventy-one thousandths	s.	317
			t.	6.098
_____	20.	two and three tenths		

HANDOUT 8-5:
STORY PROBLEMS

1. If ABC Company made 1102 dozen caps in July, how many caps did they make altogether?

2. If ABC Company made 1102 dozen caps in July, 1207 dozen in August, and 1006 dozen in September, what was the average?

3. Thuyen went on vacation. She drove 117.5 miles the first day and 342.9 miles the second day.
   Question: _____
   _____
   Answer:

4. Apples cost $.85 per pound. How much will 5.8 pounds cost?

5. Sam bought 7 pairs of socks for $14.21. How much did one pair of socks cost?

APPENDIX I
CULTURAL NOTES

Below are some mathematical cultural notes. This is not a complete list. The best resource is your class.

1) In the U.S., one thousand is thousand is written with a comma - **1,000**. In many countries, it is written with a decimal point - **1.000**.

   In the U.S., 3 and 5 tenths is written with a decimal point - **3.5**. In many countries it is written with a comma - **3,5**. The same applies when writing money amounts.

2) When Americans add or multiply, we are taught to carry above the next column

$$\begin{array}{r} {\scriptstyle 1} \\ 27 \\ +\,68 \\ \hline 135 \end{array}$$

   Students from other countries write the numbers being carried to the right of the problem or not or not at all

$$\begin{array}{rl} 27 & \\ +\,68 & 1 \\ \hline 135 & \end{array}$$

3) ESL students sometimes set up their division problem differently. Instead of $5\overline{)\,15}^{\,3}$, they set it up like this $15\,|\,5\;\;3$

   NOTE: Don't try to get the students to change the way they do division unless they want to. Instead use it as an opportunity for them to teach you.

APPENDIX I
CULTURAL NOTES
(cont'd)

4) Fractions are read from the bottom up by many Chinese students. 2/3 might read as three-two instead of two thirds. Ask around your class to see if any other nationalities do it this way.

5) Most ESL students know the metric system of measurement but are not familiar with the U.S. system. It is a good idea to keep referring to the metric system for comparison as you teach the U.S. standard system.

ANSWER KEY

HANDOUT 1-2:

I add
I subtract
I multiply
I divide

HANDOUT 3-1:

1.	$13.25	Multiply
2.	$25.00	Subtract.
3.	$19.00	Add, then divide by 3
4.	$10.00	Add

HANDOUT 3-3:

1.	12	2.	Eggs, Donuts, etc.
3.	1107	4.	Yes
5.	1007	6.	13,287
7.	multiply by 12	8.	1007
9.	divide by 12		

HANDOUT 3-4:

1. 8 + 10 = 18
2. Caps 150 + 200 = 350
3. Any answer is O.K. example $5.50 or $3.75
   How much more do baseball caps cost?
   $5.50 - $3.75 = $1.25

ANSWER KEY
(cont'd)

HANDOUT 3-4 (cont'd):

4. Dozen
   How many dozen caps did he cut this week? or How many caps did he cut this week. 456 x 5 = 2280
   (Answers will vary. Students may think this is for 6 days.)

5 & 6 Answers will vary depending on numbers students use.

HANDOUT 4-1:

1.	A	2.	A	3.	A	4.	=
5.	A	6.	B	7.	B	8.	B
9.	A	10.	B				

HANDOUT 5-1:

1.	1072	2.	12,864
3.	45	4.	450

HANDOUT 6-1:

A.	Bind Back/Cut Apart	B.	Sew Strap
C.	0.1585	D.	0.1662
E.	Sew Strap	F.	15 minutes (rounded off)
G.	8 1/2 minutes	H.	Ticket 2

ANSWER KEY
(cont'd)

HANDOUT 7-1:

1. Stuff Visor
2. 144
3. .2402
4. 34 1/2 minutes, 34.5888 minutes

HANDOUT 7-2:

1. Bind back/Cut apart
2. .1585
3. 144
4. 22.824 minutes
5. $2.72
6. $75.26
7. 10 hours

HANDOUT 8-1:

1. Sew Strap
2. .1662
3. 79
4. 13.13 minutes
5. $1.57
6. $40.53
7. 5.7 hours (339.71 minutes)

HANDOUT 8-5:

1. 73,224
2. 1105
3. How far did she drive altogether? 460.4 miles
4. $4.93
5. $2.03